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ABSTRACT

An information-control systems model for evaluation of adult education programs is offered and illustrated. The model is based upon identifying principal subsystems, such as source, channel and audience, which are involved in initiation, production, delivery and reception of educational messages. These subsystems are seen as separate but interdependent, having the power singly or jointly to make crucial decisions about generation, dissemination or withholding of information. The extent to which these subsystems may in fact exert such controls has been demonstrated in a variety of research studies, many in the mass communication area. Specific application of the model is illustrated in the evaluation of the "Mulligan Stew" television series which, although directed at a young audience, has implications for evaluation of any adult education program which involves extensive use of the mass communications media. The study included before-after student responses in eight schools and estimates of such response from nutrition specialists, information specialists, television station personnel, and teachers. In terms of final outcome, the Mulligan Stew results generally and strongly support the information control systems model, and testify to its utility in evaluational research. (RC)

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# A SOCIAL SYSTEMS APPROACH TO EVALUATION RESEARCH

C.N. Olien, P.J. Tichenor, G.A. Donohue

Criteria and procedures for evaluation research have been major concerns as large scale and costly social action programs have multiplied on the state and national levels. Innovative approaches to social problems that involve complex organizations and processes raise an array of questions about the evaluational process. 1, 2/ Tests of individual behavior modification are typical criteria for evaluation. Evaluation might provide more extensive structural information about how specific goals may or may not have been achieved which might provide a broader base for improving future programs 3/

A social system approach to evaluation appears fruitful in view of the fact that social action programs occur in the context of a particular social system and often in an atmosphere of social conflict and tension. 4/ Such an approach views educational programs as outcomes of interaction among separate, but interdependent social subsystems, such as source, channel and audience 5/ and may be contrasted with a more frequent tendency to concentrate on the final outcome of message delivery based on whether given behavioral objectives are achieved. 6/ For example, film evaluations are generally based on measured responses of the clientele group viewing it and concentrates primarily on the point of contact and on clientele response alone. 7, 8, 9/

A social system as used here refers to a pattern of interacting and interdependent roles, and may be viewed as containing a variety of distinct but functionally interdependent subsystems. 10/ Relevant subsystems for educational communication would include a source subsystem of disciplinary specialists, a program production and delivery subsystem, and an audience subsystem. 11/ Specification of subsystems depends upon the particular program under evaluation.

Identification of interdependent segments, or subsystems, is central to an analysis of information control processes which in turn may determine the outcome of an educational program. 12/

Such information controls are exerted at different organizational levels. In a study of schools in Hagerstown, school administrators seemed generally more favorable toward instructional television than teachers did, and teachers in lower grades were more favorable than those in higher grades. 13/ Greater administrator-teacher similarity at lower grades may result from the greater direct control by administrators at the elementary level.

In a Minnesota study concerning science communication through printed media, reporters tended to produce more understandable and accurate messages when they operated in an environment of rather rigid controls. 14/ These control factors included specific editor assignment, dependence upon prior printed materials such as press releases or journal articles, and contact with sources having administrative responsibilities and experience.

Importance of the organizational structure in determining content of messages is further illuminated in Cantor's study of 24 producers and script writers who specialize in children's television programs. 15/ While all parts of the system

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may affect content, she points out, the most important influence is from those segments in direct interaction with the writer. She frequently found script writers treating violence not in terms of their own feelings about it, but rather in line with station or network policy. Her finding is similar to that of Donohew, who reported a close correspondence between attitudes of Kentucky newspaper publishers and the way in which their newspapers covered the Medicare issue. 16, 17/ In the Donohew study, publishers' attitudes and content of their papers were most anti-Medicare in small rural towns where one might have (in the early 1960's when the study was done) expected strong opposition from the local medical profession.

## Evaluation and social conflict

Tension, arising from competition, deviance or other forms of social conflict is a characteristic condition of social systems. 18,19 / Amount and type of tension is related to the nature of the social structure. For example, the more the horizontal segmentation among source specialists producing a program, the greater the likelihood of differences among specialists about form and content of messages. Similarly, conflict may be related to vertical pluralism. The greater the number of administrative levels in program development, the greater the opportunities for differences to occur.

Along with identification of subsystems, systems analysis involves identification of conflicts and tension and possible consequences for program outcome. Tension by itself is not, necessarily, either negative or positive in its consequences. 20/ Conflict and tension may be functional for system maintenance, for goal attainment, or for adaptive adjustment. In a community, the conflict atmosphere surrounding an issue may lead to sharply focused media attention on a topic and an attraction of attention among audience segments who might otherwise ignore such a topic. The outcome may be widespread familiarity and a more equal distribution of understanding across educational levels than would otherwise occur. Several analyses of data have demonstrated that conflict can serve to reduce knowledge gaps within a community. 21/

Conflicts may have a variety of consequences for program outcomes. Film producers may defer to sources on what is said about a topic, but argue vehemently over what topics to cover. Also, film-makers may have quite different views than sources have about what cultural symbols to use and what social values to highlight and reinforce. Chemists and cinematographers may in principle defer to each other's professional expertise, but there may be a large gray area in message production that doesn't fall neatly within one discipline or the other. Chemists are concerned about how their profession is portrayed and cinematographers have standards for dramatic and visual quality. The two concerns might come in conflict, as when the cinematrographer wishes to dramatize a scene involving a narcotics addict and medical expert in a way that the chemist finds offensive to the research professions. While such conflicts in television production may tend to be resolved in favor of organizational policy, as Cantor found, their existence may also be functional for creative production. 22, 23/

Whether a conflict is or is not functional is itself an important aspect of systems analysis in program evaluation. For example, extension agents and a sample of community editors were asked identical questions about adult education programs in community development. Both groups agreed that some sort of community planning

was needed. On specifics, however, there were sharp differences. While agents were oriented toward the University educational mission, editors viewed Rural Areas Development and Poverty Programs as largely federal efforts for pouring funds into financially-depressed towns and regions. Editors and agents had the most discrepant views on topics that were most relevant to their relationship. 24/ In this case, fundamental communication blockage existed between two key communication roles in the system. 25/

## Audience assessment

Ability to assess audience response by a given subsystem--such as a source or channel group--is another aspect of system analysis. Research evidence to date suggests that professional communicators are not necessarily more effective than subject matter source specialists in estimating audience response to messages.

Several studies have pointed to the marked ability of source roles to estimate audience response with relatively high degrees of accuracy. In Tannenbaum's studies with small purposive samples, scientists (as well as science writers) were more accurate in estimating science reader interest in news stories than were editors. 26/ Also, in a Minnesota study of adolescent reaction to two ETV films, meteorologists were more accurate in predicting audience reaction to a film on weather and meteorology than were professional photography experts. 27/ (TABLE 1)

Identification of audience assessment errors through systems evaluation might well lead to adjustments that improve ability of subsystems to predict audience response. Given an opportunity to study and know a particular community, channel communicators may be quite accurate in estimating certain aspects of popular reaction to a mass media message. Cleary and Beal gave extensive information about a village and a local water controversy to 21 television producers. Reactions of local TV viewers were then compared with producer estimates, which were highly accurate in predictions of audience size, audience evaluation, and amount of audience talking about the show. 28, 29, 30, 31/

## System Legitimation

One stage, or key event in systems analysis is legitimation. 32/ Sesame Street, for example, was socially legitimized by a broad spectrum of educational institutions when it was first introduced.33/ A six-part series on nutrition developed through the Cooperative Extension Service network for 9 to 12-year-olds was widely praised, and thereby legitimized, by groups of extension educators and nutritionists around the nation before it was sent out to TV stations and schools for showing to youth groups. 34/ This legitimation appears to have been instrumental in gaining widespread use of the series by both stations and classroom teachers.

A phase which will ordinarily follow legitimation is commitment and allocation of organizational and media resources to production and delivery of the program. Purposive messages do not move by themselves, but are exchanged in a system in proportion to the social energy generated by the various groups. The series on nutrition cited above required the mobilization of a wide network of agencies, including the U.S. Department of Agriculture, state universities, state education departments, television stations, county extension staffs, and elementary school districts. Promotion was both horizontal and vertical, and each form of diffusion depended upon a prior commitment at some agency level to devote a certain amount of energy to the project. 35/

## Applications of a systems evaluation model

A recent application of the systems evaluation model is concerned with an educational television series on nutrition for 9 to 12-year-olds, termed "Mulligan Stew." In this case the design dealt with (a) the institutional context in which the programs were presented, (b) expectations of clientele performance among groups and agencies developing and delivering the series, and (c) the extent to which the clientele group attained the formally stated objectives.

This series of six half-hour color TV films represents a major broadcast media educational effort, tied in with the Expanded Food and Nutrition Program of the U.S. Department of Agricultural Federal Extension Service, in cooperation with the various State Extension Services. The Mulligan Stew series was produced by a group of film and nutrition specialists in the USDA, in cooperation with program and nutrition experts at several state universities.

Formal objectives of the Mulligan Stew series included, principally, assistance to young people in acquiring and applying nutritional principles for healthful, productive individual development. While the series was developed so that it could conceivably "stand alone" on prime time television, the stress was on integration either with classroom nutrition instruction or with food and health projects in such organizations as 4-H clubs. Supporting educational materials included a comic book version of the films, a guidebook of group exercises for teachers or leaders, and even song books and records for original tunes and jingles produced in the films.

Casting and scripting of the "Mulligan Stew" series was based to a considerable extent on use of then-current dramatic and cinematic techniques for attracting young people. A number of Sesame Street characters and techniques were employed. Briefly, the series was based on a neighborhood group of six youngsters, between 9 and 12 themselves, cast as the "Mulligan Stew Gang" in a modified adventure-comedy format. In each film, the "gang" solved a "nutritional problem" of certain individuals or groups by applying their knowledge of nutritional principles. One case was an overweight race car driver who lost his driving job until the Mulligan Stew gang figured out his diet problem. They reshaped his wife's cooking and his exercise routine so that he slimmed down, went back to driving the race car, and took first place past the checkered flag.

Symbolic representations and character roles in the series are clearly calculated to appeal to dominant values of American society. The films emphasize, repeatedly, such virtues as good health, physical fitness, clean living, school achievement, athletic participation, respect for institutions and support of others in time of need. Various episodes make liberal use of both positive and negative social models. Through rapid-fire sequencing of scenes, the films repeat, at numerous intervals, certain slogans intended to instill the idea of a balanced diet, the importance and function of different food nutrients, and related nutritional principles.

While a great deal of professional expertise was mobilized for production of the series, the planning and production was not an entirely harmonious process. There were, for example, some sharp divisions of opinions between some groups of nutritionists, extension program administrators, and production personnel over both content and mode of presentation. Analytically, however, these divisions seemed to attract professional attention to the project and stimulate interest in its completion.

The Mulligan Stew series was released for national use in an atmosphere of optimism and high promise. The series was made available in each state through state university extension services who in turn contacted county extension offices and school districts, with promotional material describing the series and the supporting project material.

In Minnesota, a total of 2,546 schools requested supporting materials for more than 100,000 elementary school students, mostly in grades 4, 5 and 6. The series was scheduled on 6 commercial television channels and 4 educational channels for a six-week period in October and November of 1973. Supporting materials were closely tied to the series, so that after each film, the teachers could select from a variety of specific exercises linked to the themes of that film.

Evaluation of this series, in the Minnesota study, was based upon measures among:

1. A total of 37 nutritional research specialists in 3 midwestern Universities, all of whom were familiar with the series and many of whom had taken part in planning of educational programs in their states which would utilize the films.

2. Eight 4-H information specialists, in the same 3 states, who were responsible for coordinating and distributing educational broadcast materials relevant to 4-H programs.

3. Eleven television station representatives in the 10 stations in Minnesota and adjoining states that broadcast the series into Minnesota. These station representatives had originally received the films, and had cooperated with one of the 4-H information specialists in scheduling the series as a public service activity.

4. A total of 17 classroom teachers in schools in which student reaction to the series was studied in detail.

5. More than 1,000 4th, 5th, and 6th grade children in eight different schools in which the series was supported in varying degrees. These schools included a before-after control school in an area of Wisconsin where the series was not available, a before-after control where the series was on TV but no supporting materials were used, and three schools where the series was on TV and either moderate or heavy use of supporting materials were used along with in-class videotapes of the series. One school served as an after-only control.

A few general hypotheses guided this evaluation. One was that among the various non-audience subsystems, those most closely associated with the original sponsoring agency would tend to have the highest expectations of audience response, compared with subsystems more closely associated with the client audience. This meant that nutrition specialists and 4-H information specialists would be expected to have higher levels of expectations than would the TV or teacher groups.

A second guiding hypothesis was that the more closely associated a prior subsystem is with the audience subsystem, the more accurate the perceptions of audience reaction and behavior will be. According to this reasoning, the teachers would tend to have the most accurate perceptions of reaction to the films.

Finally, audience reaction was expected to relate directly to control factors in the final delivery situation. Specifically, the more extensive the control over the message environment in which the purposive message is presented, the higher the level of achievement of behavioral objectives within that audience. Operationally, this meant that student learning and behavioral change (more regular eating of balanced diets) would be highest in schools which used the most supporting materials and re-ran the films on videotape in the school.

## Findings from the Hulligan Stew evaluation

The findings were partially consistent with the first hypothesis, in the sense that 4-H information specialists made the most optimistic estimates of audience reaction. This finding is entirely in line with the fact that the information specialists were more closely identified with the USDA film program unit that produced the series than was any other subsystem in the study. Contrary to expectations, however, the nutritionists tended to give far more conservative estimates of student reaction than 4-H information specialists did, perhaps reflecting the fact that there were differing professional views on what nutritional content should be contained in such a series. Among the 37 nutritionists, six identified content which, in their judgment, was either partially or entirely inaccurate, and three took strong exception to what the considered to be improper portrayal of the teacher role in the films.

The second hypothesis was supported, in the sense that teachers and television station personnel tended to make more accurate estimates than 4-H information specialists did. On the other hand, the nutritionists, presumably farther removed from the young population in this communication chain, are nevertheless close to student estimates.

By averaging the absolute discrepancies between ratings across the 7 items, it is possible to make an overall comparison of accuracy in estimating student reactions, as in the bottom line of table 2. Overall, the television station personnel made the most accurate estimates, followed by the nutritionists, teachers, and information specialists, in that order. These findings may be viewed in light of previous findings, such as those of Tannenbaum, who found that scientists in some cases may predict reader values about science news more accurately than editors do. 36/ Similarly, in an earlier Minnesota study, a group of photography professionals were less accurate than source specialists in estimating audience evaluations of interest. 37/ In the Hulligan Stew study, a sharp line may be drawn between media personnel and the information specialists who, in this case, make quite different estimates, which may well reflect their differing location in the entire system.

The third hypothesis, that learning and behavioral change would be related to information controls at the point of delivery, received strong support. In both before-after control schools--the one where the films were not on TV and the one where the films were available but not supported in the classroom--there was no observed change in either measured nutritional knowledge (based on a 17 item nutritional knowledge scale) or in reported eating of balanced diets. Sharp changes occurred in the three schools where there was moderate or heavy in-school support of the films. Two-way analysis of variance showed a highly significant difference among schools ($p < .001$) but no difference by grade. There was, however, a sharp

difference across classrooms, according to teacher input. The number of nutritional exercises used in the film is a rather powerful predictor of knowledge change across the 14 classrooms in the three schools with moderate to heavy use of supporting materials. The rank correlation for these 14 rooms is .82 ($p < .01$).

Importance of such direct control may be highlighted by the further finding that student expression of interest in the series was not highest in the schools that had the highest viewing or the highest gain scores. Furthermore, within schools, gain scores were generally unrelated to evaluations of the films or the Mulligan Stew actors.

In general, then, the Mulligan Stew evaluational study provides strong support for an evaluational approach based on a model of information and knowledge control. To the extent that knowledge is produced, packaged, and delivered in the institutional educational setting with full deployment of institutional resources, there is a greater likelihood of learning and retention of content and of change in related behavior. On the other hand, extensive availability of such content on the mass media channels alone does not appear to meet the conditions necessary for the intended result.

Responses of the non-audience groups may be seen in a systems perspective in terms of their predictive value, as contrasted with their controlling influence on final outcomes. Given the key location of information specialists in the organizational network distributing the series, their estimates most likely indicate an early and deep professional commitment to the entire project. From an analytical perspective, these responses may predict more about the use of the program in the total system than about ultimate audience response.

Most accurate from a predictive point of view are the television station representatives' estimates, at least for young people who in fact see the series. But actual level of viewing of an avowedly purposive broadcast message of this type requires organizational control at the audience subsystem level as a necessary condition. This is not to say that school control is the only means of meeting this condition: 4-H club organizations or other parent-youth groups might well be able to provide functionally equivalent organized attention.

## Summary

An information-control systems model for evaluation of adult education programs is offered and illustrated. The model is based upon identifying principal subsystems, such as source, channel and audience, which are involved in initiation, production, delivery and reception of educational messages. These subsystems are seen as separate but interdependent, having the power singly or jointly to make crucial decisions about generation, dissemination or withholding of information.

The extent to which these subsystems may in fact exert such controls has been demonstrated in a variety of research studies, many in the mass communication area. Control over content, for example, may relate to media leadership ties with the community leadership, and to links between media personnel and source systems. Similarly, source and channel subsystems have differing abilities to predict levels and type of potential audience response to messages; in several studies, scientist

or other specialist sources could make such predictions with levels of accuracy either similar to or greater than predictions by some mass media groups.

Specific application of the model is illustrated in evaluation of the "Mulligan Stew" television series which, although directed at a young audience, has implications for evaluation of any program of adult education which involves extensive use of the mass communication media. The study included before-after student responses in eight schools and estimates of such response from nutrition specialists, information specialists, television station personnel, and teachers.

Among estimates of audience evaluation, the most optimistic were made by information specialists who were closely tied to the sponsoring agency. The most accurate estimates of audience reaction were made by television station personnel. Close in accuracy to the station personnel were nutrition specialists, providing further support for the generalization that professional research groups may be highly accurate in predicting audience response to popularized versions of content in their specialized fields.

In terms of final outcome, the Mulligan Stew results generally and strongly support the information control systems model, and testify to its utility in evaluational research. The factor most closely and immediately related to knowledge gain is organized input at the school and classroom level; broadcasting the series on prime time television (Saturday morning) hours for the target audience without in-school support produced no measurable change in knowledge change or related behavior.

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TABLE 1

ETV Content Reactions Among Audience, Source, and Channel Groups

| | | 1 Audience Sample | 2 Source Group (Meteor.) | 3 Channel Group (Photo. Spec.) | ** Differences 1 - 2 | 1 - 3 |
|---|---|---|---|---|---|---|
| Meteorology Film | | | | | | |
| Social Familiarity Scale* (max = 3) | | 1.43 | 1.00 | 1.16 | -.43 | -.27 |
| | S.D. | 1.15 | | | | |
| Level of Interest Scale (max = 6) | | 4.89 | 5.00 | 3.66 | +.11 | -1.23 |
| | S.D. | 1.06 | | | | |
| Actor Evaluation Scale (max = 7) | | 4.85 | 5.33 | 4.16 | +.48 | -.69 |
| | S.D. | 1.70 | | | | |
| Photography Film | | | | | | |
| Social Familiarity Scale (max = 3) | | 1.81 | -- | 2.14 | -- | +.33 |
| | S.D. | .96 | | | | |
| Level of Interest Scale (max = 6) | | 3.93 | -- | 3.14 | -- | -.79 |
| | S.D. | .97 | | | | |
| Actor Evaluation Scale (max = 7) | | 4.88 | -- | 4.28 | -- | -.60 |
| | S.D. | 1.59 | | | | |

* In all scales, scoring is in a positive direction, so that a higher score means that the film has been judged as either higher in social familiarity, higher in interest, or more positive in actor evaluation.

** A plus sign means the source (or channel group) is higher on that scale than the audience sample.

TABLE 4

Estimates of Student Evaluations of Mulligan Stew Films, Compared with Actual Ratings of Student Viewers in 5 Schools

| | Specialists' Estimates | | | | Schools | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PERCENT WHO:** | Teachers (N=17) | 4-H Information Spec. (N=8) | Commercial TV Reps. (N=10) | Nutritionists (N=37) | B (N=55)* | C (N=90) | D (N=143) | E (N=140) | F (N=214) | School Total (N=642) |
| 1. Rate Mulligan Stew as more interesting than other TV programs you usually watch. | 11.7 | 87.5 | 36.4 | 16.2 | 18.2 | 30.0 | 47.5 | 29.3 | 23.3 | 30.5 |
| *** Difference | -18.8 | +57.0 | + 5.9 | -14.3 | | | | | | |
| 2. Think their (children's) closest friend would like the Mulligan Stew TV series. | 76.5 | 87.5 | 63.6 | 62.2 | 30.9 | 70.0 | 81.8 | 50.7 | 50.5 | 58.6 |
| *** Difference | +17.9 | +28.9 | + 5.0 | + 3.6 | | | | | | |
| 3. Feel the Mulligan Stew TV shows would make young people like 4-H better. | 41.2 | 50.0 | 36.4 | 18.9 | 30.9 | 30.0 | 55.2 | 45.7 | 39.2 | 42.2 |
| *** Difference | - 1.0 | + 7.8 | - 5.8 | -23.3 | | | | | | |
| 4. Did the Mulligan Stew Gang do things that you (9-12 year-olds) like to do yourself? (% yes) | 88.2 | 100.0 | 63.6 | 67.6 | 45.5 | 74.4 | 79.0 | 64.3 | 70.1 | 69.3 |
| *** Difference | +18.9 | +30.7 | - 5.7 | - 1.7 | | | | | | |
| 5. Did most of the Mulligan Stew Gang wear the kind of clothes that you like to wear? (% yes) | 94.1 | 100.0 | 90.9 | 91.9 | 56.4 | 73.3 | 80.4 | 72.2 | 64.5 | 70.3 |
| *** Difference | +23.8 | +29.7 | +20.6 | +21.6 | | | | | | |
| 6. Did most of the Mulligan Stew Gang have hair styles like young people you know, or not? (% yes) | 88.2 | 100.0 | 90.9 | 91.9 | 56.4 | 74.4 | 84.0 | 70.0 | 79.9 | 75.9 |
| *** Difference | +12.3 | +24.1 | +15.0 | +16.0 | | | | | | |
| 7. Did most of the Mulligan Stew Gang talk the way you and your friends do? (% yes) | 94.1 | 100.0 | 45.4 | 59.5 | 41.8 | 55.6 | 61.5 | 48.6 | 42.1 | 49.7 |
| *** Difference | +44.4 | +50.3 | - 4.3 | + 9.8 | | | | | | |
| ****Average of Difference | 20.4 | 32.6 | 8.9 | 12.9 | | | | | | |

* Number of cases in each school is based on number who viewed one or more Mulligan Stew shows.

** For the four non-student groups, these questions were worded as estimates of how students would respond, for example: "Would you say the Mulligan Stew shows were more interesting, or about as interesting to 9 to 12 year-olds as programs that they usually watch.

*** Average difference between non-student groups and student total proportion.

****Average difference in either direction between non-student groups and overall student proportion.